4-6-2016

Evaluating The Decision Making Process of Pediatricians' Recommendations for First Complementary Foods in Infants

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Overview

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- **Rice Cereal – Helpful or Harmful?**
- **Purpose of Study**

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- **Theoretical Framework**

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Next Steps

2012: 18% of children 6-11 were obese

Obesity in children has tripled since 1980

Obese children are two times more likely to be obese as an adult

“It’s tricky because **everybody likes a chunky baby**”

-Provider, Children’s Hospital of Philadelphia

Biro, F., & Wien, M. (2010). Childhood obesity and adult morbidities. *The American Journal of Clinical Nutrition.* http://ajcn.nutrition.org/content/91/5/1499S.full

Center for Disease Control and Prevention. (2012). Childhood obesity facts. *Adolescent and School Health.* http://www.cdc.gov/healthyyouth/obesity/facts.htm

Sedula, M., Ivery, D., Coates., R., Freedman, D., Williamson, D., Byers, T. (1993). Do obese children become obese adults? A review of the literature. *Preventative Medicine.* 22(2): 167-77.

Infants – A Population Overlooked

Little evidence to support whether infant nutrition has positive or negative health outcomes.

American Journal of Clinical Nutrition in 1994 stated 3 critical periods in childhood for the development of obesity:

- Gestation and early infancy
- Period of adiposity rebound that occurs between 5 and 7
- Adolescence

Research response in only 2 of the areas

Why the exclusion?

"Because of the unique nutritional needs, eating patterns, and developmental stages" for infants 0 to 24 months.

The Dietary Guidelines – Expanding Guidance for 2020 - Infant Nutrition's relationship to long term health outcomes has "grown as a public health interest"

Dietz, W.H. (1994). Critical periods in childhood for the development of obesity. *The American Journal of Clinical Nutrition.* 51(5). 955-959.

United States Department of Agriculture (USDA) and U.S. Department of Health and Human Services (DHHS). (2015). Dietary guidelines for Americans 2015-2020. 8th Edition. http://health.gov/dietaryguidelines/2015/guidelines/

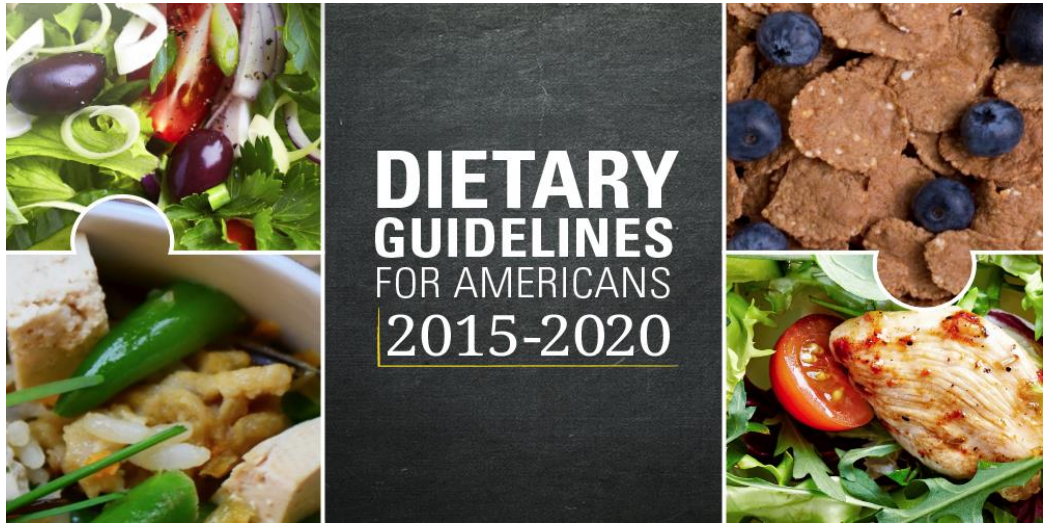
Dietary Guidelines for Americans – Outreach and Education

Guidance on reducing the risk of chronic diseases, including obesity.

December 2015, the most recent version was published and focused on:

- "Individuals ages 2 and older in the United States, including those who are at risk of chronic disease"

If childhood obesity negatively impacts adult obesity, should we be intervening earlier?



United States Department of Agriculture (USDA) and U.S. Department of Health and Human Services (DHHS). (2015). Dietary guidelines for Americans 2015-2020. 8th Edition. http://health.gov/dietaryguidelines/2015/guidelines/

Current Guidance for Infant Feeding

AMERICAN ACADEMY OF PEDIATRICS

Breastfeeding/Formula Feeding

- Exclusive breastfeeding for the first 6 months (if possible)
- Bottle Feeding: only formula or breastmilk in the bottle

Food Introduction

- Solid foods at 6 months
- Exposure to a “wide variety of healthy foods” and textures

WORLD HEALTH ORGANIZATION

Start receiving food in addition to breastmilk from 6 months onward.

Foods should be appropriate texture for the age of the child

Prepared in a safe manner

Amount of food, frequency and consistency is key.

American Academy of Pediatrics. (2012). Switching to solid foods. *Ages & Stages*. http://www.healthychildren.org/English/ages-stages/baby/feeding-nutrition/Pages/Switching-To-Solid-Foods.aspx
World Health Organization (WHO). (2016) Complementary feeding. *Nutrition*. http://www.who.int/nutrition/topics/complementary_feeding/en/

Healthy People 2020

2020: Inclusion of Early and Middle Childhood

- Healthy People 2010 included this in Maternal, Infant, and Child Health

Early Childhood is 0-8 years:

- Physical
- Cognitive
- Socio-emotional
- Language development

Healthy People 2020 goals for infants pertaining to feeding:

- 60% breastfeed at 6 months
- 35% breastfeed at 12 months

United States Department of Health and Human Services (USDHHS). (2010). Healthy people 2010. *Office of Disease Prevention and Healthy Promotion.* http://www.healthypeople.gov/2010/
United States Department of Health and Human Services (USDHHS). (2016). Healthy people 2020. *Office of Disease Prevention and Healthy Promotion.* https://www.healthypeople.gov/2020/topics-objectives

What We Know Today: United States

FEEDING INFANTS AND TODDLERS STUDY (FITS) – 3022 MOTHERS

- 76% of infants were fully or partially breastfeed at birth
- At 6 months, declined to 30%
- At 12 months, declined to 16%
- Average age of infant cereal = 4.6 months (Range: .2-15 mos)
- **America is only halfway to Healthy People 2020 goals.**

FITS concluded “more parents and caregivers can benefit from guidance about introduction of developmentally appropriate micronutrient rich first solid foods”

INFANT FEEDING PRACTICES STUDY II – LONGITUDINAL STUDY CONTINUATION – 1334 MOTHERS

- 40% of infants were given solid foods earlier than 4 months of age, which is earlier than the recommendations from AAP and WHO.

Mother’s responses:

- Perception of when their child was hungry
- It helped their baby sleep and stay asleep
- Their healthcare provider told them to begin early
- Their own mothers or family members suggested to

Clayton, H., Li, R., Perrine, C., & Scanlon, K. (2013). Prevalence and reasons for introducing infants early to solid foods: Variations by milk feeding type. *Journal of the American Academy of Pediatrics*. 131(4). http://pediatrics.aappublications.org/content/131/4/e1108

Briefel, R., Reidy, K., Karwe, V., Devaney, B. (2004) Feeding infants and toddlers study: Improvements needed in meeting infant feeding recommendations. *Journal of American Dietetic Association.* 104(1). http://www.sciencedirect.com.proxy1.lib.tju.edu/science/article/pii/S0002822303014512

What We Know Today: Importance of Iron Rich Foods

Birth – 6 months : .27 mg

7 – 12 months: 11 mg

Heme Iron: meats – more easily absorbed

Non-heme iron: plant source/cereals

Iron Sources for Complementary Foods

Spinach – 2.0 – 3.4 mg (4 oz)

Beef – 1.4 – 3.3 mg (2.5 oz)

Liver – 6.2-13.4 mg (2.5 oz)

Infant Cereal – 5.5 mg* (2.5 oz)

*depends on product

"Most babies' first food is a little iron-fortified infant single grain cereal mixed with breast milk…once your little one gets the hang of eating cereal off a spoon…introduce single-ingredient pureed vegetables, fruit, or meat" –Nemours Foundation

"Rice, oatmeal, or barely? What infant cereal of other food will be on the menu for your baby's first solid meal?

By tradition, single-grain cereals are usually introduced first. However, there is no medical evidence that introducing solid foods in any particular order has an advantage…" – Healthy Children (AAP).

American Academy of Pediatrics. (2012). Switching to solid foods. *Ages & Stages.* http://www.healthychildren.org/English/ages-stages/baby/feeding-nutrition/Pages/Switching-To-Solid-Foods.aspx
The Nemours Foundation (2016). Feeding your 4 to 7 month old. *Kids Health.* http://kidshealth.org/en/parents/feed47m.html?view=ptr

Rice Cereal – Helpful or Harmful?

Endorsed by USDA, AAP, and other medical organizations

- Easy to digest
- Least likely to cause allergic reactions
- Contains important nutrients
- Can easily be altered in consistency for any developmental stage

Infant cereals can hide sugars and other nutrients levels not acceptable for an infant.

Rice products are known to contain arsenic, but levels are currently not regulated.

Naturally occurring element in the environment

Nutrition Facts

Serving Size: 1/4 cup (15g)
Servings Per Container: About 15

Amount Per Serving

Calories: 60

Total Fat:	0.5g
Trans Fat:	0g
Sodium:	0mg
Potassium:	45mg
Total Carbohydrates:	12g
Dietary Fiber:	0g
Sugars:	1g
Protein:	1g

%Daily Value	Infants 0–1	Children 1–4
Protein:	3%	3%
Vitamin A:	0%	0%
Vitamin C:	25%	20%
Calcium:	20%	15%
Iron:	45%	60%
Vitamin E:	25%	10%
Thiamin:	25%	15%
Riboflavin:	25%	20%
Niacin:	25%	20%
Vitamin B6:	25%	10%
Folate:	25%	10%
Vitamin B12:	25%	15%
Phosphorus:	6%	2%
Zinc:	20%	10%

Nutrition Facts

Serving Size: 1/4 cup (15g)
Servings Per Container: About 15

Amount Per Serving

Calories: 60

Total Fat:	1g
Trans Fat:	0g
Sodium:	0mg
Potassium:	90mg
Total Carbohydrates:	11g
Dietary Fiber:	<1g
Sugars:	4g
Protein:	1g

%Daily Value	Infants 0–1	Children 1–4
Protein:	5%	6%
Vitamin A:	0%	0%
Vitamin C:	25%	20%
Calcium:	20%	15%
Iron:	45%	60%
Vitamin E:	25%	10%
Thiamin:	25%	15%
Riboflavin:	25%	20%
Niacin:	25%	20%
Vitamin B6:	25%	10%
Folate:	25%	10%
Vitamin B12:	25%	15%
Phosphorus:	8%	4%
Zinc:	20%	10%

Gerber Rice Cereal vs Grain and Fruit Cereal

National Academy of Science. (2001) Dietary reference intakes for vitamin A, vitamin K, arsenic, boron, chromium, copper, iodine, iron, manganese, molybdenum, nickel, silicon, vanadium, and zinc. *Institute of Medicine.* https://www.iom.edu/~/media/Files/Activity%20Files/Nutrition/DRIs/DRI_Elements.pdf

American Academy of Pediatrics. (2012). Switching to solid foods. *Ages & Stages.* http://www.healthychildren.org/English/ages-stages/baby/feeding-nutrition/Pages/Switching-To-Solid-Foods.aspx

United States Department of Agriculture. (2002) Feeding infants: A guide for use in the child nutrition program. *Food and Nutrition Service.* http://www.fns.usda.gov/tn/feeding-infants-guide-use-child-nutrition-programs

Rice Cereal: Other Countries Differ

United Kingdom Food Standards Agency

- Infant rice cereal should not be substituted for breastmilk or formula for children under 4 years old.
- Concerns over arsenic exposure

Swedish National Food Agency

- No rice based drinks for children under 6
- Concerns over arsenic exposure

Denmark

- Limit the intake of rice based cereals
- Concerns over arsenic exposure

European Society for Pediatric Gastroenterology Hepatology and Nutrition: Committee on Nutrition study's on arsenic in infant cereals concluded that arsenic exposure during infancy likely affects long term health, recommending **rice intake by infants should be "as low as possible".**

Food Standards Agency. (2009). Survey of total and inorganic arsenic in rice drinks. *Food Survey Information Sheet 02/09*
Hojsak, I., Braegger, C., Bronsky, J. et al. (2015). Arsenic in rice: A cause for concern. *Journal of Pediatric Gastroenterology and Nutrition*. 60(1). http://www.espghan.org/fileadmin/user_upload/guidelines_pdf/Hep_Nutr/arsenic_in_rice.pdf

The Rice Cereal Debate

PROS

- American's find infant cereals, including rice, as an important source of iron.
- Easily adaptable for ages/stages
- Low risk of allergic reaction
- Can be a source of grain

CONS

- High levels of arsenic
- Flavor limitations could impact taste preferences later in life
- Introducing more flavorful foods later, rather than earlier could contribute to allergies
- Separation of baby food and family food

This is an example of how the information that is out there for mothers is conflicting.

Food Standards Agency. (2009). Survey of total and inorganic arsenic in rice drinks. *Food Survey Information Sheet 02/09*

Hojsak, I., Braegger, C., Bronsky, J. et al. (2015). Arsenic in rice: A cause for concern. *Journal of Pediatric Gastroenterology and Nutrition.* 60(1). http://www.espghan.org/fileadmin/user_upload/guidelines_pdf/Hep_Nutr/arsenic_in_rice.pdf

Australian Society of Clinical Immunology and Allergy (2016). Feeding infant advice. *Information for Patients, Consumers and Carers.* http://www.allergy.org.au/images/pcc/ASCIA_PCC_Infant_Feeding_Advice_2016.pdf

Purpose of this Study

Previous studies captured that mothers were not following the overarching medical guidelines. This study focuses on ‘why’ this may be the case.

The decision making process and understanding from all parties on infant nutrition, specifically, infant rice cereal, was also a point of importance.

This study was comprised of 3 parts

- Document the feeding guidelines from medical associations
- Understand what pediatricians are recommending to new mothers
- Capture the response from mothers on the understanding and personal practices in feeding

Methods

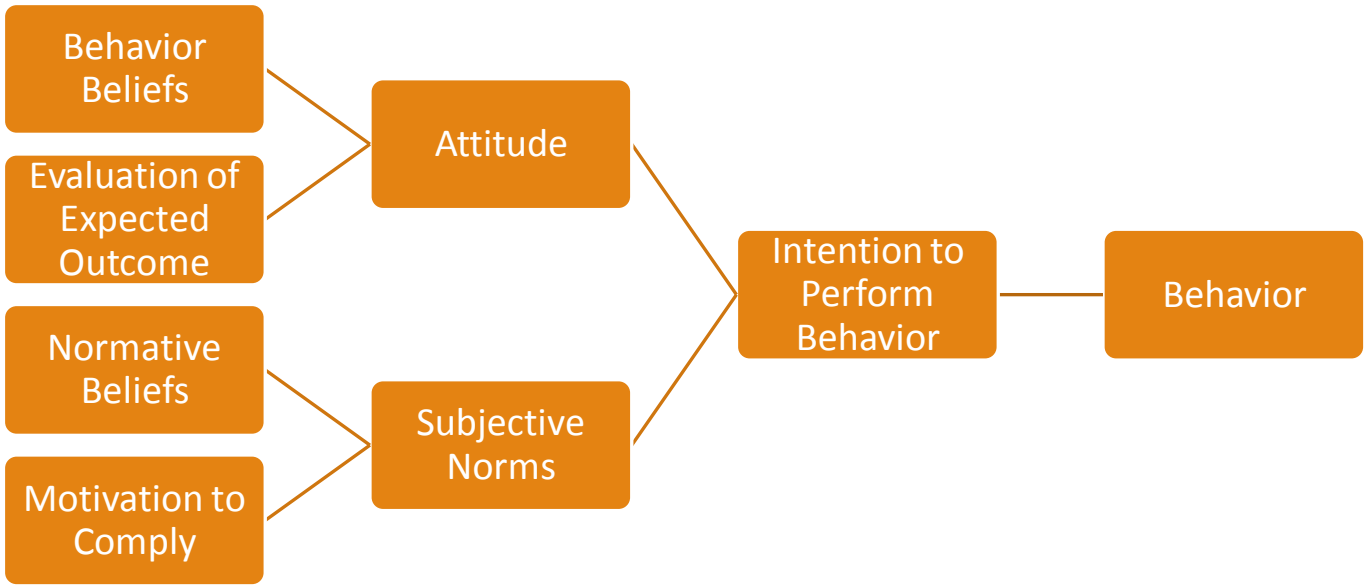
- Mothers, physicians actively involved in pediatric care, and policy creators/advocators/subject matter experts in nutrition policy were interviewed
- 30 minute phone interview, audio recorded and fully transcribed
- Qualitative analysis was conducted through coding by 2 independent coders

Study Population

Mothers	Healthcare Providers	Policy Experts
Criteria: -Infant under 2 years old -Can have more than 1 child -Former colleagues, current acquaintances, or heard of the study through an associate -Attempted to represent a mix of non-working, part time, and fulltime mothers. -Adoptive mothers were excluded due to questions pertaining to conversations while pregnant, as well as discussions around breastfeeding.	**Criteria** -Working in pediatrics – at any position with a minimum of a bachelor's degree. (pediatric physicians, nurse practitioners, general pediatric nurse, etc.) -May or may not have been in continuing education -Any type of practice was acceptable (inpatient unit, ambulatory care center, etc.)	**Criteria** -Actively engaged in infant nutrition at the policy level -No organizational affiliation required -Expected to understand how and why certain guidelines were developed/disseminated to their audience. -Subject matter expertise in infant nutrition was not required, but policy practices were expected.
Participants -5 mothers, all had 1 child under 2 -2 mothers first time parents -Employment status: restaurant manager, teacher, physician, claims processor, and active duty military	**Participants** -5 providers -1 physician in pediatrics in the ER, 1 Nurse Practitioner in NICU, 3 physicians in pediatric primary care. -4 of 5 participants' workplace had a relationship with an academic institution.	**Participants** -3 policy experts -American Academy of Pediatrics – PA Chapter -Food, Nutrition & Policy Consultants -Columbus Department of Health

Theoretical Framework – Theory of Reasoned Action

"Behavior intentions, which are the immediate antecedents to behaviors, are a function of salient information about the likelihood that performing a particular behavior will lead to a specific outcome" (Ajzen & Fishbein)



Results

Mothers

GENERAL SENSE OF CONFUSION ABOUT FEEDING PRACTICES

Each of the mothers expressed the constant confusion and conflicting information

"*you already know the drill*" – Military, mother of 2

"*Do your own research and then pick what you want. It's confusing and for first time parents, it's really, really, confusing*" – Teacher, first time mom

UNAWARE OF GUIDELINES

Two mothers could recite AAP guidelines about breastfeeding

None could speak to complementary feeding

Two mothers looked for organic food "*I think like a healthy thing [organic] and also when you're a working mom you have a bit of guilt sending your child off for part of the day. I think part of that made me feel better*" – Claims processor, mother of 2

Mothers

RICE CEREAL

All but one mother explained they fed or were planning on feeding infant rice cereal.

It would make their baby full, "*sleep longer*", "*slow them down*" – 2 mothers

"*It's the traditional thing*." – restaurant manager, first time mom.

One mother did not plan on rice cereal over concerns with arsenic or would cause allergies – Physician, mother of 3

Healthcare Providers

UNDERSTANDING OF GUIDELINES IS LIMITED

AAP guidelines for breastfeeding were recited by all, but "infant nutrition" was unknown.

"*I couldn't really find any specific guidelines*" – NP, NICU

It has become hard to standardize them due to the constant changes being made. – Physician, CHOP Childcare Network

PHYSICIANS ARE REACTIVE TO FEEDING, NOT PROACTIVE

"*It's more common that they've already started something on their own and then we just try to educate about how to introduce it and what to cover*" – Pediatrician, Nemours Pediatrics

"*Moms have already started doing it even without getting the counseling*" – Pediatric Attending, Nemours

Healthcare Providers

A NEED FOR NUTRITION EDUCATION

"We sometimes leave it to the patient or the consumer to decide what's good for them and not throw out your own, 'this is what I would eat at my house'. The truth is people do need education around it and the lack of nutrition education on the family side is huge" – Pediatrician, CHOP Childcare Network

RICE CEREAL

All of the physicians would recommend rice cereal as part of an infants first foods, some were specific to say iron fortified.

"It's an easy first food" and *"harmless"*.

Three physicians were not sure why it was recommended, but that it was the common practice.

Policy

EMPHASIS ON POSITIVE LONG TERM HEALTH

At the policy level, there is an understanding that the earlier we intervene, the greater chance we have for long term health impacts.

"*People are starting to become aware of the **importance of intervening at a younger age** is because we do see those **longer term positive health outcomes when a kid has a good experience 0 to 2**, and positive in terms that they live longer, they make more money, they're able to graduate from high school, they're able to get and secure a good job, etc...I think that has been a good thing that we've been able to show that these **longer term outcomes really are good for the economy, they're good for the populous, they're good for your community***" – Policy expert, Food, Nutrition & Policy Consultants

Policy

MORE EVIDENCED BASED RESEARCH IS NEEDED TO CREATE GUIDANCE

Without evidenced based guidance, many organizations and groups can draw different conclusions about what is a best practice.

"*Information Overload"* – Policy Expert, AAP

Expert actively looks through guidelines for discrepancies, because it happens so often.

"*For the 0-2 [age range] guidelines…we had been missing by not developing a set of cohesive recommendations for health care professionals to follow""* – Policy Expert, FNCP

Policy

INFANT NUTRITION – CURRENTLY A MODERATE PRIORITY

A small part of the many things that could impact an infants health.

Nutrition guidance could not be recalled, but initiatives such as Safe Sleep were recognized

Many perspectives on a specific problem.

RICE CEREAL

Neutral or negative associations with rice cereal

"*An example of a general overarching feeding practice that I know is not helpful or healthy*" Policy Expert, FNCP.

AAP expert has seen a movement away from rice cereal and is aware of the potential arsenic exposure.

Discussion

Lack of Guidance Burdens Mothers

Physicians are not equipped to council mothers

- No infant nutrition for older generation physicians
- No solid guidance

Mothers expressed a feeling that physicians expected them to do their own research

Some providers did not council women to avoid overwhelming them with options.

If there is counseling on foods, it is reactive, not proactive

- Mothers are heavily reliant on subjective norms, how their mothers fed them, what their friends are doing etc.

Rice Cereal

Policy

- Negative or neutral associations.
- “An example of a general overarching feeding practice that I know is not helpful”
- Movement away from rice cereal, possible concerns with arsenic

Physicians

- All physicians recommended rice cereal
- “Easy first food”, “harmless”, iron rich, convenient for mom
- Few were not aware of why they recommended it

Mothers

- 4 of 5 mothers will feed or fed rice cereal
- “Traditional food”, baby will “sleep longer”, “slow her down a bit”

Theory of Reasoned Action – Attitudes/Beliefs and Subjective Norms Shape Infant Feeding Practices and Recommendations

Lack of evidence based data results in vague guidance
- No strong incentive for physicians to follow

No clear, consistent message
- Ability to influence mothers to make healthy choices is minimal

Without proper information dissemination:
- Mothers must pull from their subjective norms
  - May or may not align with the healthiest behaviors
  - Behaviors that have been deemed unacceptable by the medical community still perpetuates through generations of families relying on each other
- Mothers must pull from their own attitudes and beliefs
  - Shaped by non-clinical experiences
  - Media and personal research

Mothers are developing their own plan for feeding and physicians are waiting for the behavior to happen before intervening. They are removing themselves from being influential in behavior outcome.

Unexpected Themes

Convenience: Key Driver for Providers and Mothers

Both pediatricians and mothers suggested convenience as a factor in how they recommended feeding and practiced it

Convenience was discussed more often than nutrition and health when discussing food

Two mothers attempted to make their own food but was too “burdensome‘”

Physicians discussed recommending feeding practices that will be “more convenient for mom” so they feel less overwhelmed.

Providers and Mothers: A Complex Relationship

"TRYING TO FIGURE OUT IF THEY'RE SAYING THE ANSWER THAT THEY WANT THE DOCTOR TO HEAR AS OPPOSED TO WHAT'S ACTUALLY HAPPENING“ – PROVIDER, CHOP CHILDCARE NETWORK

The need to please or not disappoint the physician.

Physicians refrained from personal stories, did not want to seem like they were pressuring if the mother wanted to take a different approach

“I DIDN’T WANT TO INSULT THEIR INTELLIGENCE OR WHATEVER BUT THEY ASSUME EVERYONE KNOWS BECAUSE THEY KNOW” – MOTHER, ACTIVE DUTY

Mothers refrained from speaking up about possible issues or questions.

Mothers believed that physicians were taking a soft approach to guidance.

Study Limitations

Small sample size

Four of five physicians were practicing in academic hospitals or clinics

Self reported data

- Selective memory

Next Steps

Future Research Opportunity & Recommendations

Increased sample size and demographics could provide a greater variation in response

- Focus on rural vs. urban populations
- Assessing different cultures
- Focus on socio-economic status
- Breastfed infants vs. formula fed infants

Research if the infant population does impact the obesity epidemic, as it has been overlooked in previous studies and guidance.

Understand why the United States continues to recommend infant rice cereal over other industrialized nations and the impact on health outcomes.

Enhance the current communication gaps between providers and patients.

- Engaging providers early to build trust

Thank you

QUESTIONS?